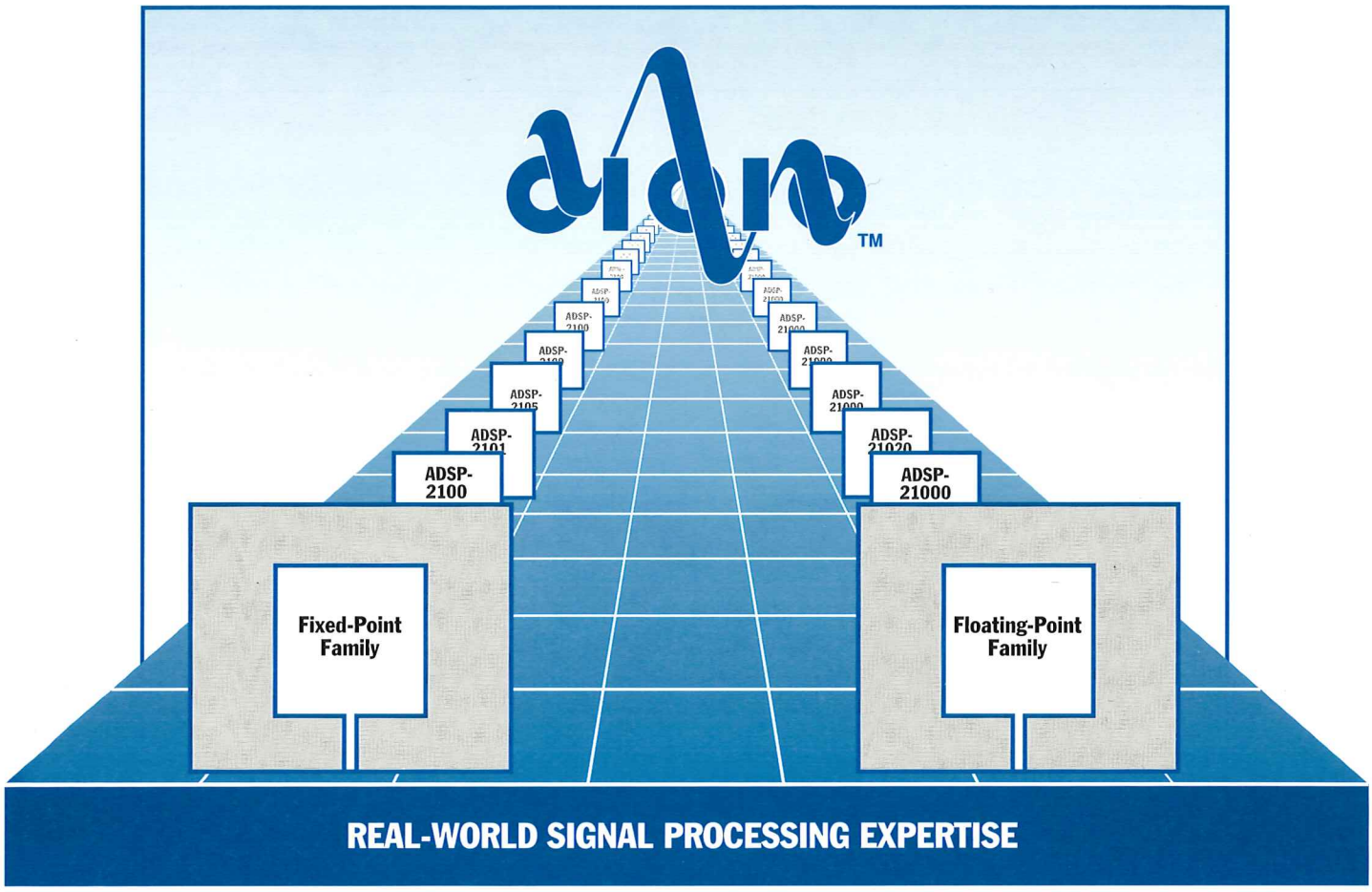
Mastering the Mix in Signal Processing



Analog Devices' Family of DSP Processors

For more than twenty-five years, Analog Devices has provided high-performance solutions to signal processing problems. This extensive interaction with designers of leading-edge signal processing systems forms the basis for continued development of new signal processing products. Today, Analog Devices offers a wide range of programmable DSP processors based on an architecture that is optimized for signal processing. Processors range from a very low-cost fixed-point microcomputer, to the highest performance IEEE-compatible floating-point microprocessor.

Together with our signal processing customers, Analog Devices has created the industry's first family of Mixed-Signal Processors (MSProcessors™) and Mixed-Signal Peripherals (MSPeripherals™). Mixed-Signal Processors combine a programmable DSP architecture for signal processing with Analog Devices' precision signal acquisition circuitry to provide compact, low-cost, high-performance, single-chip solutions. Analog Devices is committed to the continuing integration of high-performance signal acquisition systems with optimized DSP processors.

Future MSProcessors will extend the performance of both the signal acquisition system and the DSP engine to address emerging applications requirements. What applications can you imagine with MSProcessors?

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Analog Devices' DSP Processor Key Feature Summary

			Instruction Cycle Time (ns)	Off-Chip Harvard Architecture	Internal Program Memory (RAM)	Internal Data Memory (RAM)	Internal Program Cache (word)	Program Memory Boot	Serial Ports	Programmable Timer	On-Chip A/D and D/A	External Interrupts	Low Power Modes	Pin Count	Package Type
Optimized DSP Architecture	16-Bit Fixed-Point	ADSP-2100A	80	✓	–	–	16x24	–	–	–	–	4	–	100	PGA, PQFP, CQFP
		ADSP-2101	60	–	2Kx24	1Kx16	–	✓	2	✓	–	3	1	68	PGA, PLCC
		ADSP-2102	60	–	2Kx24*	1Kx16	–	✓	2	✓	–	3	1	68	PGA, PLCC
		ADSP-2105	100	–	1Kx24	0.5Kx16	–	✓	1	✓	–	3	1	68	PLCC
		ADSP-2106	100	–	1Kx24*	0.5Kx16	–	✓	1	✓	–	3	1	68	PLCC
		ADSP-2111**	60	–	2Kx24	1Kx16	–	✓	2	✓	–	3	1	100	PGA, PQFP
		ADSP-2112**	60	–	2Kx24*	1Kx16	–	✓	2	✓	–	3	1	100	PGA, PQFP
		ADSP-21msp50**	77	–	2Kx24	1Kx16	–	✓	2	✓	✓	3	2	132/144	PQFP/PGA
		ADSP-21msp51**	77	–	2Kx24* & 2Kx24 ROM	1Kx16	–	✓	2	✓	✓	3	2	132/144	PQFP/PGA
	32/40-Bit Floating-Point	ADSP-21020	40	✓	–	–	32x48	–	–	–	–	4	1	223	PGA, PPGA

* RAM/ROM ** Includes an 8/16-bit Host Interface Port (HIP) integrated on-chip

Optimized DSP Architecture

Architectures optimized for DSP must meet the five following requirements:

Fast, Flexible Arithmetic

- Arithmetic units arranged in parallel for Fixed- and Floating-Point family
- Single-cycle register context switch for Fixed- and Floating-Point family
- Separate input and output registers for Fixed-Point family
- General purpose register file for Floating-Point family

Extended Dynamic Range of Multiply/Accumulate

- 40-Bit accumulator for Fixed-Point family
- 80-Bit accumulator for Floating-Point family

Single-Cycle Access of Dual Operands

- Provides single-cycle, 3-bus performance:
  – next instruction fetch
  – 2 data operands

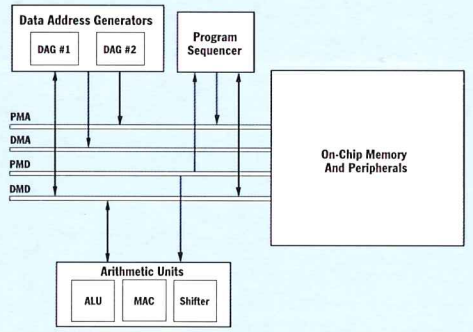
Hardware Circular Buffering

- Maintains 8 simultaneous circular buffers for Fixed-Point family
- Maintains 16 simultaneous circular buffers for Floating-Point family

Zero-Overhead Looping and Single-Cycle Conditional Branching

- Single-cycle conditional arithmetic instruction for Fixed- and Floating-Point
- Stack supports 4 levels of nested loops for Fixed-Point family
- Stack supports 16 levels of nested loops for Floating-Point family

Analog Devices' Optimized DSP Architecture



Analog Devices extends the optimized DSP architecture to include features such as:

- Auto data buffering
- Auto boot from external byte-wide EPROM
- Auto companding of data through serial port

DSP Development Support

All processors are supported with a comprehensive set of development tools including:

- ANSI C-Compiler
- Linker
- System Builder
- Low-cost EZ-TOOLS
- Assembler
- Simulator
- Demonstration Board
- In-Circuit Emulators

Applications assistance is provided by:

- Expert DSP Staff
- Applications Handbooks
- Applications Assistance Line
- Computer Bulletin Board
- *DSPatch* Applications Newsletter
- Applications Library
- 3-Day Programming Workshop

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